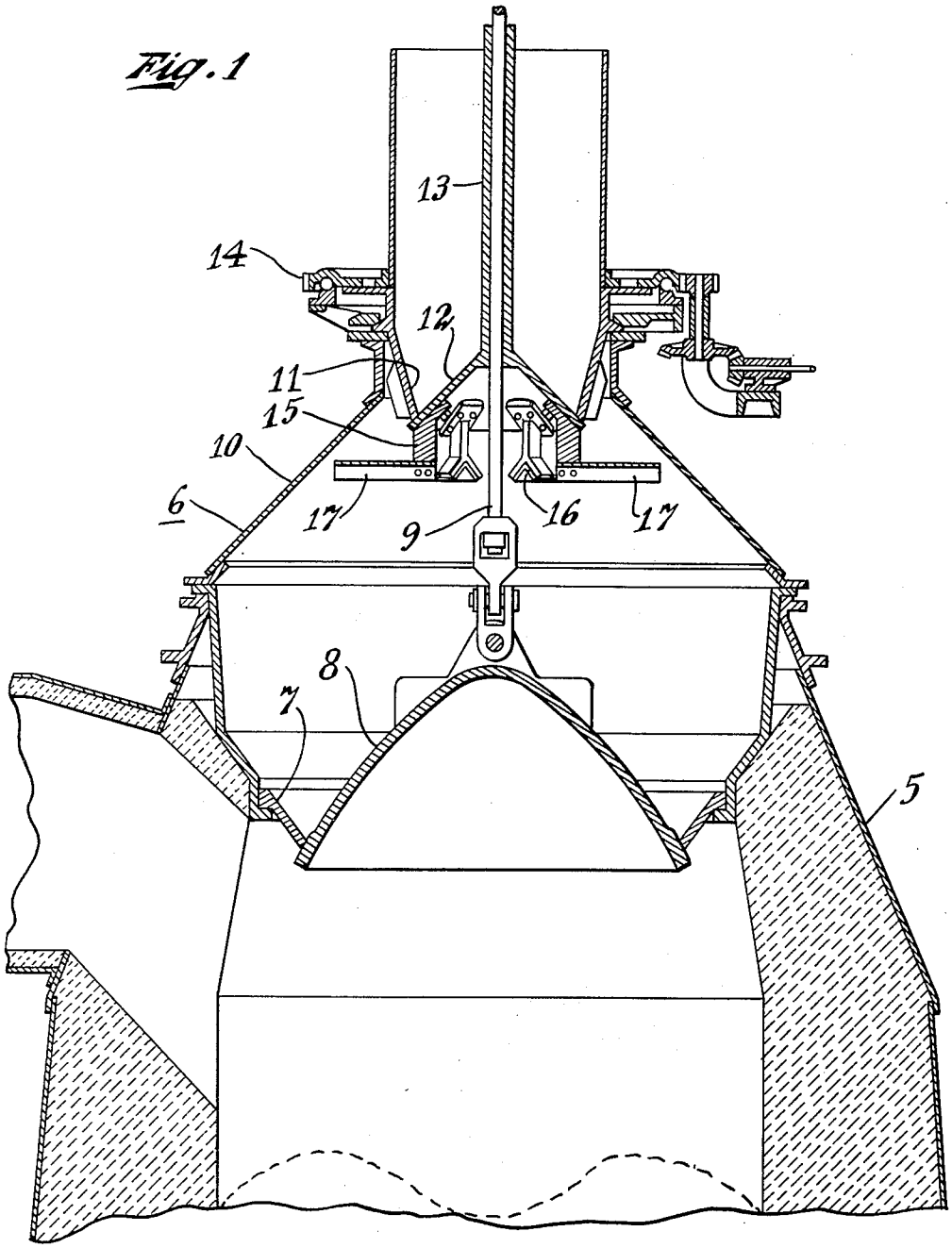
Nov. 21, 1933. C. O. BARKS 1,936,374

BLAST FURNACE CHARGING TOP

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Fig. 1




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Fig. 2

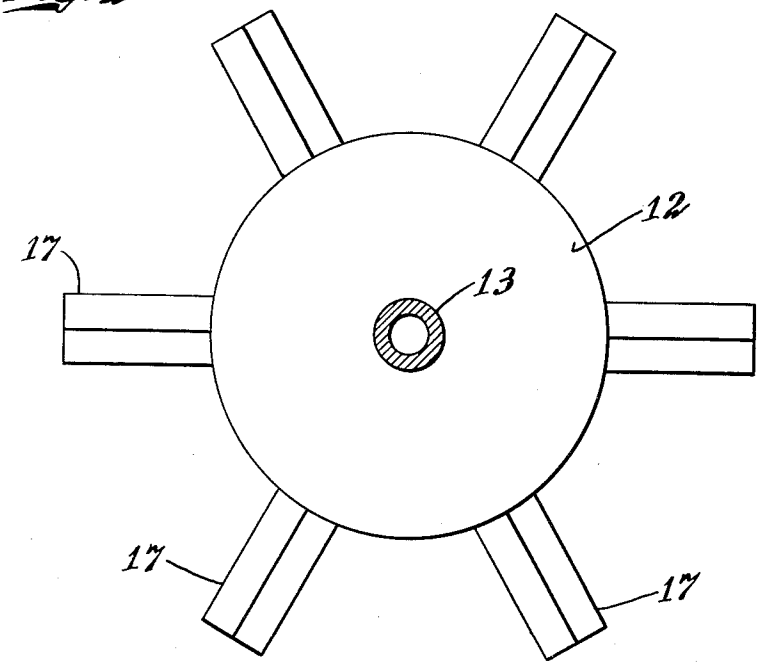
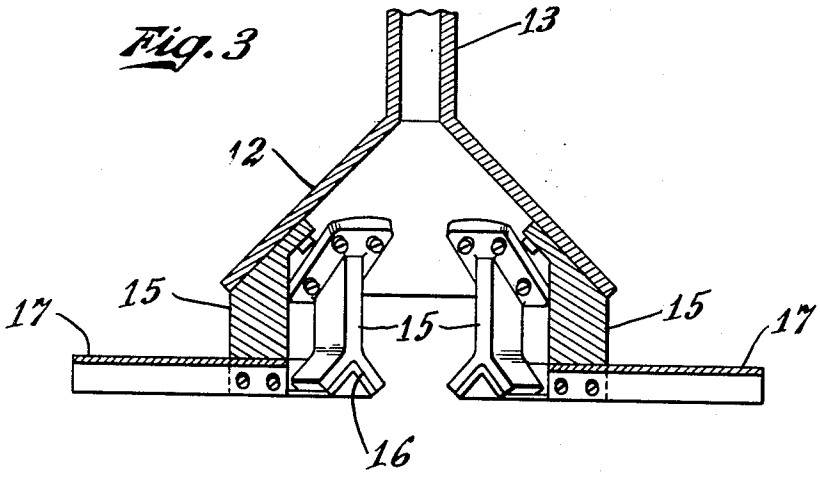



Fig. 3




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# UNITED STATES PATENT OFFICE

1,936,374

## BLAST FURNACE CHARGING TOP

Charles O. Barks, Birmingham, Ala.

Application April 28, 1930. Serial No. 447,796

14 Claims. (Cl. 214—37)

My invention relates to a charging top for blast furnaces comprising a hopper associated with a lower or big bell and an upper or small bell, the latter being adapted to coact with its respective seat to close the top of the charging hopper when the big bell is lowered to charge the stock from the hopper into the furnace.

In tops of the character described, the small bell is mounted independently of the big bell and is usually rotated step-by-step automatically responsive to the operation of the skip or any equivalent hoisting means for the stock.

My present invention contemplates the application of a novel arrangement of deflectors in the path of the stock falling from the little to the big bell, these deflectors preferably being attached to the small or upper bell to the end that each constituent of the stock as it falls onto the big bell will collect thereon in piles distributed about the hopper so that the ore, coke, and limestone will be deposited in the furnace in such manner as to obtain a better and more uniform penetration of the stock in the furnace by the air blast whereby I obtain a more efficient operation of, and better production from, the furnace.

More particularly, my invention constitutes an improvement upon the blast furnace top forming the subject matter of United States Letters Patent No. 1,492,013, issued to me on the 31st day of March, 1924, in which I show deflectors mounted fixedly in the charging hopper between the bells.

In my present invention corresponding deflectors are made movable, they preferably being underhung from the upper or small bell and rotatable therewith so as to assume different operating positions as the stock is charged and therefore they will produce a different distribution of stock from that obtained by my patent aforesaid.

The advantage of adapting the means which rotate the deflectors to cause them to assume successive differing operating positions lies in the fact that thereby I prevent the tendency of the ore piles to fall in vertical alignment in the furnace which they would do in my previous patent wherein the deflectors were fixed and not movable. When the ore piles fall in vertical alignment there is a tendency of the gases to channel and not be distributed in the best manner throughout the furnace burden, but by rotating the deflectors so that they will assume different operating positions the ore piles will fall out of alignment and in fact will follow a helical path about the furnace, causing the most efficient distribution of the air blast as it works up through the burden.

My invention comprises the novel details of construction and arrangements of parts, which in their preferred embodiment only are illustrated in the accompanying drawings which form a part of this specification, and in which:—

Fig. 1 is a vertical cross-sectional view through a typical blast furnace charging top showing the small bell equipped with improved stock distributors, the details of the skip hoist drive for shifting the operating position of the little bell angularly about its vertical axis being omitted as same may be of any well known or standard construction.

Fig. 2 is a plan view enlarged of a portion of the small bell.

Fig. 3 is a vertical sectional view on the line III—III of Fig. 2.

Similar reference numerals refer to similar parts throughout the drawings.

In the embodiment of my invention illustrated, I show a portion of the top of the stack 5 of a typical blast furnace having a charging top 6 suitably mounted thereon and comprising a charging hopper 7 normally closed by the lower or big bell 8 having an operating rod 9 rising above the charging top and there connected to any suitable mechanism, not shown, for raising and lowering the big bell. The inverted frusto conical top 10 of the charging hopper comprises a seat 11 for the upper or small bell 12 which is operated by a sleeve 13 surrounding the rod 9 and connected to a suitable gear 14 which is adapted to be engaged by suitable mechanism for rotating the small bell with a step-by-step movement responsive to the operation of the stock hoisting mechanism. As such means for rotating the small bell is well known and forms no particular part of my present invention, I do not illustrate it, as any means suitable to this end may be employed which will so move the distributors that they will assume different operating positions.

The small bell in question is of the standard type, such as is now in customary use, and my invention consists in mounting on this bell a novel arrangement of stock deflectors which will now be described.

To the lower portion of the inner face of the small bell I attach a number of brackets, preferably in the form of castings 15 which are suitably bolted or otherwise secured rigidly to the small bell and which depend substantially below its

lower edge. In practice they depend approximately 8'' below the bell 12. Each bracket has a bottom V-shaped seat 16 to receive an angle iron deflector 17 that is suitably bolted or otherwise secured rigidly at one end to the seat, its other end projecting sufficiently beyond the base of the small bell to engage and deflect the stock falling from said small bell into the hopper.

By dropping the deflectors substantially below the little bell I give the stock opportunity to clear the bell and to strike the deflectors in full flight whereby there is no tendency of the stock to collect on the deflectors and they will produce more sharply defined distinct piles of stock on the big bell.

In practice these deflectors extend approximately 18'' beyond the projecting periphery of the small bell and they are disposed with their apex uppermost. Five or six of these deflectors may be arranged about the small bell as may be desired, and it is obvious that as they wear they may be readily replaced at a nominal expense.

In operation, as the ore, coke or limestone is charged into the hopper from the hoist mechanism it is deflected as it falls from the small bell into the hopper and it will therefore collect in piles upon the big bell. As the ore and coke components are charged alternately and the small bell is moved between charges of ore and coke, the coke and ore will be dropped in separate piles, the piles of ore being staggered with respect to the piles of ore adjacent thereto both above and below to produce the distribution of the air blast before referred to. Having in ths manner placed the requisite amount of stock on the big bell, the small bell is raised to seal the top of the charging hopper and the big bell is lowered therefrom discharging the stock thereon into the blast furnace. The coke, ore, etc., falling into the furnace will maintain the distribution established for them upon the big bell and this results in such distribution of the ore with relation to the coke and limestone that the stock in the furnace is very pervious to the furnace blast and a larger production of iron and a more efficient operation of the blast furnace results.

Though I have described with great particularity the details of the embodiment of the invention herein shown, it is not to be construed that I am limited thereto, as changes in arrangement and substitution of equivalents may be made by those skilled in the art without departing from the invention as defined in the appended claims.

What I claim is:—

1. In a blast furnace charging top, the combination with a charging hopper and a big bell therefor, of a small bell adapted to close the upper portion of the hopper and carrying radial deflectors underhung therefrom and adapted to split the stock falling from the small bell at a level substantially below the said small bell so as to distribute it in piles on the big bell.

2. A blast furnace charging top according to claim 1, in which the small bell is of the rotatable type movable step-by-step responsive to the feed of stock into the hopper so as to deposit the ore piles out of vertical alignment in the furnace.

3. A blast furnace charging top according to claim 1, in which the deflectors are formed by angle irons carried by brackets underhung from the small bell.

4. In a blast furnace charging top comprising a hopper and a lower bell, an upper bell having a seat, means to raise and lower the upper bell and rotate it step-by-step about a vertical axis to different operating positions, a plurality of metallic brackets underhung from the upper bell and projecting substantially below its bottom level, and an angle iron deflector mounted on each bracket to project radially into the path of stock falling from the upper bell, said deflectors being equi-distantly spaced about the upper bell.

5. In a blast furnace charging top, the combination with a charging hopper and a big bell therefor, of a small bell rotatably mounted and rotatable multiple deflector means interposed between said bells and adapted to deposit the stock in a plurality of piles arranged in spaced relation about the big bell.

6. Charging means for blast furnaces comprising, a large lower bell and hopper; a small upper bell and hopper; a hood enclosing the space between said hoppers; and rotatable outwardly-extended spaced stock-splitting members supported at their inner ends between the large and small bells for splitting stock discharged from said small bell into distinct substantially radial piles.

7. Charging means for blast furnaces comprising, a charging hopper; a vertically-reciprocable big lower distributing bell with which said hopper co-acts; a hood supported by said hopper; a second hopper mounted on said hood and having a lower chute portion adapted to discharge through said hood into said charging hopper; an upper little charging bell with which the bottom edge of said chute co-acts to form a gas seal; and a plurality of spaced stock-splitting members secured to said little bell and extended outwardly therefrom below said chute, said members being formed and arranged to split stock discharged from said little bell into distinct substantially radial piles.

8. Charging means for blast furnaces comprising, a charging hopper; a vertically-reciprocable big lower distributing bell with which said hopper co-acts; a hood supported by said hopper; a second hopper mounted on said hood and having a lower chute portion adapted to discharge through said hood into said charging hopper; a rotatable upper little charging bell with which said chute co-acts to form a gas seal; and a plurality of spaced stock-splitting members secured to said little bell and extended outwardly therefrom below said chute.

9. A blast furnace top comprising a charging hopper; a vertically-reciprocable big lower distributing bell with which said hopper co-acts; a hood supported by said hopper; a rotatable hopper mounted on said hood and having a lower chute portion adapted to discharge through said hood into said charging hopper; an upper little charging bell with which said chute co-acts to form a gas seal, the rotation of said hopper inducing the rotation of said little bell; means for supporting said little bell and for raising and lowering the same; and a plurality of spaced stock-splitting members supported at their inner ends between the large and small bells and extended outwardly beyond said little bell toward said hood wall.

10. Charging means for blast furnaces comprising a charging bell and a plurality of substantially horizontal spaced stock-splitting members below the bell and extended outwardly beyond the bell perimeter, said members being supported at their inner ends and being formed and arranged for splitting stock discharged from the bell into distinct substantially radial piles.

11. Charging means for blast furnaces comprising a charging hopper, a vertically-reciprocable

lower bell with which said hopper co-acts, a second hopper spaced from and mounted above said charging hopper, a hood enclosing the space between said hoppers, an upper bell mounted for vertical movement in said hood and associated with said second hopper so as to form a gas seal therewith when in raised position, a rotatable series of spaced stock-splitting members formed and arranged to split stock discharged from said upper bell into distinct substantially radial piles, and means supporting said members between said upper bell and said hood.

12. Charging means for blast furnaces comprising a charging hopper, a hood supported by said hopper, a second hopper mounted on said hood, an upper rotatable bell mounted for vertical movement in said hood and associated with said second hopper so as to form a gas seal therewith when in raised position, a series of spaced stock-splitting members formed and arranged to split stock discharged from said upper bell into distinct substantially radial piles, and means supporting said members between said upper bell and said hood and spaced from said hood.

13. Charging means for blast furnaces comprising a charging bell and a plurality of spaced stock-splitting members secured to said bell and extended outwardly beyond and below the bell perimeter, said members being formed and arranged to split stock discharged from said bell into distinct substantially radial piles.

14. A blast furnace charging top according to claim 5, in which the multiple deflector means are rotated so as to assume successive differing operating positions thereby to deposit the ore piles out of vertical alignment in the furnace.

CHARLES O. BARKS.